

wherein A is $(R_4)_d - \overset{|}{CR_5} - X$;

wherein X is $\overset{(Z)_f}{|} - (CR_6)_m - (Y)_e$;

where N is positively charged;

wherein q = 1 to 100,000, wherein when q = 2 to 100,000 each monomer of formula I may be the same as or different from the other monomers of formula I;

wherein Z may be the same as or different from Y;

wherein each Y and Z are independently selected from the group consisting of -OH, -NH₂, -SH, -PO₃H, -CO₂H, -SO₃H and hydrogen;

wherein f is an integer from 0 to 2, m is an integer from 0 to 20 and e is an integer from 0 to 2;

wherein R₄, R₅, and R₆ may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, mercaptan, thiol,

halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups, and d is an integer from 0 to 2;

wherein a, b, and c are independently an integer from 0 to 1, with the proviso that no more than two of a, b, and c are zero;

wherein R_1 , R_2 and R_3 may be the same or different and are independently selected from the group consisting of:

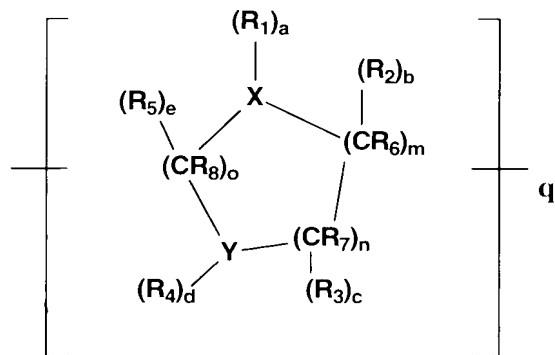
a) =O and;

b) $(W)_g$

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- $(CR_7)_n$;

wherein each R_7 and W may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups; g is an integer from 0 to 2 and n is an integer from 0 to 20, with the proviso that if two of R_1 , R_2 , and R_3 are =O, then the other is not =O;

Formula II:

wherein Formula II is saturated or unsaturated;

wherein $q = 1$ to 100,000, wherein when $q = 2$ to 100,000, each monomer of formula II may be the same as or different from each other monomer of formula II;

wherein X is selected from the group consisting of N, C, O, P and S;

wherein Y is selected from the group consisting of O, N, S, P, C, -O-NH-, -O-CH₂-NH-, -O-CH₂-O-, -NH-CH₂-NH-, -O-CH(CH₃)-NH-, -NH-CH(CH₃)-NH-, -O-CH(CH₃)-O-, -NH-C(CH₃)₂-NH-, -O-S-,

-O-CH₂-S-, -NH-S-, -NH-CH₂-S-, and other mercaptan, phosphato, alkoxy, oxide, ether, esters (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups;

wherein R₁, R₂, R₃, R₄, R₅, R₆, R₇ and R₈ may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups; and

wherein a, b, c, d, e, m, n and o are integers which may be the same or different and are independently selected from 0 to 2 for a, b, c, d, and e, and 0 to 5 for m, n and o.

56. (New) The composition of claim 55, with the proviso that when q = 1 and one of (R₁)_a, (R₂)_b, and (R₃)_c is oxygen and the other two are the same or different and are independently selected from the group consisting of hydrogen, methyl, ethyl and propyl, then A is not methyl, ethyl or propyl.

57. (New) The composition of claim 55, wherein when a, b, or c is zero, the corresponding R group is a pair of electrons.

58. (New) The composition of claim 55, wherein Y and/or X are N and m, n and o are 1.

59. (New) The composition of claim 55, wherein Y and/or X are N and/or O, and m and n are 1, and o is 2.

60. (New) The composition of claim 55, wherein said composition comprises at least two compounds having the formula I or II, or salts or esters thereof.

61. (New) The composition of claim 60, wherein said composition comprises 2 to 5 compounds having the formula I or II, or salts or esters thereof.

62. (New) The composition of claim 60, wherein said composition comprises proline.

63. (New) The composition of claim 60, wherein said composition comprises an N-alkylimidazole compound.

64. (New) The composition of claim 63, wherein said N-alkylimidazole compound is 1-methylimidazole or 4-methylimidazole.

65. (New) The composition of claim 55, wherein said compound is selected from the group consisting of proline, glycine, 4-hydroxyproline, pipecolic acid, 4-methylmorpholine N-oxide, carnitine, ectoine, poly(2-ethyl-2-oxazoline) of average molecular weight about 50,000 to about 500,000 daltons, and poly(diallyldimethylammonium chloride) of average molecular weight about 100,000 to about 200,000 daltons.

66. (New) The composition of claim 60, wherein said compound is selected from the group consisting of proline, glycine, 4-hydroxyproline, pipecolic acid, 4-methylmorpholine N-oxide, carnitine, ectoine, poly(2-ethyl-2-oxazoline) of average molecular weight about 50,000 to about 500,000 daltons, and poly(diallyldimethylammonium chloride) of average molecular weight about 100,000 to about 200,000 daltons.

67. (New) The composition of claim 55, wherein said enzyme having nucleic acid polymerase activity is selected from the group consisting of a DNA polymerase, an RNA polymerase and a reverse transcriptase.

68. (New) The composition of claim 67, wherein said DNA polymerase is selected from the group consisting of *Taq*, *Tne*, *Tma*, *Pfu*, VENTTM, DEEPVENTTM and *Tth* DNA polymerases, and mutants and variants thereof.

69. (New) The composition of claim 67, wherein said reverse transcriptase is selected from the group consisting of M-MLV reverse transcriptase, RSV reverse transcriptase, AMV reverse transcriptase, RAV reverse transcriptase, MAV reverse transcriptase and HIV reverse transcriptase, and mutants and variants thereof.

70. (New) The composition of claim 67, wherein said reverse transcriptase is substantially reduced in RNase H activity.

71. (New) A composition for use in synthesizing a nucleic acid molecule comprising one or more enzymes having nucleic acid polymerase activity and one or more isolated amino acids.

72. (New) A method for synthesizing a nucleic acid molecule, comprising:

- (a) mixing a nucleic acid template with one or more of the compositions of claim 55 or claim 71 to form a mixture; and
- (b) incubating said mixture under conditions whereby a first nucleic acid molecule complementary to all or a portion of said template is made.

73. (New) The method of claim 72, further comprising incubating said first nucleic acid molecule under conditions whereby a second nucleic acid molecule complementary to all or a portion of said first nucleic acid molecule is made.

74. (New) A nucleic acid molecule made according to the method of claim 72.

75. (New) A method for amplifying a nucleic acid molecule comprising:

- (a) mixing nucleic acid template with one or more of the compositions of claim 55 or claim 71 to form a mixture; and
- (b) incubating said mixture under conditions whereby a nucleic acid molecule complementary to all or a portion of said template is amplified.

76. (New) A method for sequencing a nucleic acid molecule comprising:
- (a) mixing a nucleic acid molecule to be sequenced with one or more primers, one or more of the composition of claim 55 or claim 71, one or more nucleotides and one or more terminating agents to form a mixture;
 - (b) incubating said mixture under conditions whereby a population of molecules complementary to all or a portion of said molecule to be sequenced is synthesized; and
 - (c) separating said population to determine the nucleotide sequence of all or a portion of said molecule to be sequenced.

77. (New) A kit for use in synthesis of a nucleic acid molecule, said kit comprising one or more of the compositions of claim 55 or claim 71.

78. (New) The kit of claim 77, wherein said kit comprises at least two of said compositions.

79. (New) The kit of claim 77, further comprising one or more components selected from the group consisting of one or more nucleotides, one or more DNA polymerases, one or more reverse transcriptases, one or more suitable buffers, one or more primers and one or more terminating agents.